



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

August 19, 2020

MEMORANDUM TO: Victor Hall, Chief
Vogtle Project Office
Office of Nuclear Reactor Regulation

FROM: Jennivine Rankin, Project Manager /RA/
Vogtle Project Office
Office of Nuclear Reactor Regulation

SUBJECT: AUDIT REPORT FOR VOGTLE ELECTRIC GENERATING
PLANT UNITS 3 AND 4, REQUEST FOR LICENSE
AMENDMENT: CORE MAKEUP TANK BORON
CONCENTRATION REQUIREMENTS (LAR 20-004)

By letter dated April 30, 2020 (Agencywide Documents Access and Management System (ADAMS) Accession Number ML20121A288), Southern Nuclear Operating Company (the licensee) requested an amendment to Combined License (COL) Numbers NPF-91 and NPF-92, for Vogtle Electric Generating Plant (VEGP) Units 3 and 4.

The requested amendment would change the Updated Final Safety Analysis Report (UFSAR) in the form of departures from the incorporated plant-specific Design Control Document (DCD) Tier 2 information and involves changes to the plant-specific Technical Specifications (COL Appendix A).

The requested amendment would revise the upper limit of the Core Makeup Tank (CMT) boron concentration Technical Specification (TS) Surveillance Requirement (SR), the mass of trisodium phosphate (TSP) required by TS Limiting Condition for Operation (LCO) and associated SR, and the frequency of performance of the CMT boron concentration TS SR.

CONTACT: Jennivine Rankin, NRR/VPO
301-415-1530

The Nuclear Methods, Systems, and New Reactors Branch, the Technical Specifications Branch, and the Corrosion and Steam Generator Branch (SNRB, STSB, and NCSG) conducted an audit from May 18 to August 12, 2020. The purpose of the audit was to gain a better understanding of the proposed changes and to review related documentation and non-docketed information in order to evaluate the acceptability of the proposed changes to the license.

Docket Nos.: 52-025 and 52-026

Enclosure:
Regulatory Audit Report

Plan cc: See next page

AUDIT REPORT FOR VOGTLE ELECTRIC GENERATING PLANT UNITS 3 AND 4, REQUEST
FOR LICENSE AMENDMENT: CORE MAKEUP TANK BORON CONCENTRATION
REQUIREMENTS (LAR 20-004) DATED: August 19, 2020

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OFFICE	NRR/VPO/PM	NRR/VPO/LA	NRR/DNRL/NCSG/BC	NRR/DSS/SNRB/BC
NAME	JRankin	RButler	SBloom	RPatton
DATE	8/14/2020	8/13/2020	8/17/2020	8/17/2020
OFFICE	NRR/DSS/STSB/BC	NRR/VPO/BC		
NAME	VCusumano	VHall		
DATE	8/17/2020	8/19/2020		

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Vogtle Mailing List

(Revised 4/7/2020)

cc:

Resident Manager
Oglethorpe Power Corporation
Alvin W. Vogtle Nuclear Plant
7821 River Road
Waynesboro, GA 30830

Resident Inspector
Vogtle Plant Units 3 & 4
8805 River Road
Waynesboro, GA 30830

Office of the Attorney General
40 Capitol Square, SW
Atlanta, GA 30334

Mr. Barty Simonton
Team Leader
Environmental Radiation Program
Air Protection Branch
Environmental Protection Division
4244 International Parkway, Suite 120
Atlanta, GA 30354-3906

Southern Nuclear Operating Company
Document Control Coordinator
3535 Colonnade Parkway
Birmingham, AL 35243

Brian H. Whitley
Regulatory Affairs Director
Southern Nuclear Operating Company
3535 Colonnade Parkway, BIN N-226-EC
Birmingham, AL 35243

Anne F. Appleby
Oglethorpe Power Corporation
2100 East Exchange Place
Tucker, GA 30084

Mr. Michael Yox
Site Regulatory Affairs Director
Vogtle Units 3 & 4
7825 River Road, Building 302 (ESB)
Bin 6031
Waynesboro, GA 30830

County Commissioner
Office of the County Commissioner
Burke County Commission
Waynesboro, GA 30830

Mr. Wayne Guilfoyle
Commissioner District 8
Augusta-Richmond County Commission
4940 Windsor Spring Rd
Hephzibah, GA 30815

Gwendolyn Jackson
Burke County Library
130 Highway 24 South
Waynesboro, GA 30830

Mr. Reece McAlister
Executive Secretary
Georgia Public Service Commission
Atlanta, GA 30334

Vogtle Mailing List

Email

aagibson@southernco.com (Amanda Gibson)
acchambe@southernco.com (Amy Chamberlian)
gam@nei.org (Gia Montserrat)
Lindsay@georgiawand.org (Lindsay Harper)
bhwhitley@southernco.com (Brian Whitley)
Bill.Jacobs@gdsassociates.com (Bill Jacobs)
corletmm@westinghouse.com (Michael M. Corletti)
crpierce@southernco.com (C.R. Pierce)
dahjones@southernco.com (David Jones)
david.hinds@ge.com (David Hinds)
david.lewis@pillsburylaw.com (David Lewis)
dlfulton@southernco.com (Dale Fulton)
ed.burns@earthlink.net (Ed Burns)
edavis@pegasusgroup.us (Ed David)
G2NDRMDC@southernco.com (SNC Document Control)
George.Taylor@opc.com (George Taylor)
harperzs@westinghouse.com (Zachary S. Harper)
james1.beard@ge.com (James Beard)
JHaswell@southernco.com (Jeremiah Haswell)
jim@ncwarn.org (Jim Warren)
John.Bozga@nrc.gov (John Bozga)
Joseph_Hegner@dom.com (Joseph Hegner)
karlg@att.net (Karl Gross)
kmstacy@southernco.com (Kara Stacy)
kroberts@southernco.com (Kelli Roberts)
KSutton@morganlewis.com (Kathryn M. Sutton)
kwaugh@impact-net.org (Kenneth O. Waugh)
markus.popa@hq.doe.gov (Markus Popa)
mdmeier@southernco.com (Mike Meier)
media@nei.org (Scott Peterson)
Melissa.Smith@Hq.Doe.Gov (Melissa Smith)
mike.price@opc.com (M.W. Price)
MKWASHIN@southernco.com (MKWashington)
mphumphr@southernco.com (Mark Humphrey)
MSF@nei.org (Marvin Fertel)
nirsnet@nirs.org (Michael Mariotte)
Nuclaw@mindspring.com (Robert Temple)
Paul@beyondnuclear.org (Paul Gunter)
pbessette@morganlewis.com (Paul Bessette)
ppsena@southernco.com (Peter Sena, III)
r.joshi15@comcast.net (Ravi Joshi)
rwink@ameren.com (Roger Wink)
sabinski@suddenlink.net (Steve A. Bennett)
Michelle@cleanenergy.org (Michelle Powell)

Vogtle Mailing List

sblanton@balch.com (Stanford Blanton)
Shiva.Granmayeh@hq.doe.gov (Shiva Granmayeh)
sjackson@meagpower.org (Steven Jackson)
sjones@psc.state.ga.us (Shemetha Jones)
skauffman@mpr.com (Storm Kauffman)
slieghty@southernco.com (Steve Leighty)
sroetger@psc.state.ga.us (Steve Roetger)
syagee@southernco.com (Stephanie Agee)
TomClements329@cs.com (Tom Clements)
Vanessa.quinn@dhs.gov (Vanessa Quinn)
vcsummer2n3@gmail.com (Brian McIntyre)
wayne.marquino@gmail.com (Wayne Marquino)
weave1dw@westinghouse.com (Doug Weaver)
William.Birge@hq.doe.gov (William Birge)
X2edgran@southernco.com (Eddie R. Grant)
X2hagge@southern.com (Neil Haggerty)
X2dwwill@southernco.com (Daniel Williamson)

**Report of Regulatory Audit
License Amendment Related to
Core Makeup Tank Boron Concentration Requirements (LAR 20-004)**

**Southern Nuclear Operating Company
Vogtle Electric Generating Plant, Units 3 and 4
Docket Nos. 52-025 and 52-026**

A. Background:

In LAR 20-004, Southern Nuclear Operating Company (SNC) requests changes to the Updated Final Safety Analysis Report (UFSAR) in the form of departures from the incorporated plant-specific Design Control Document (DCD) Tier 2 information and involves changes to the plant-specific Technical Specifications (Combined License (COL) Appendix A).

The LAR includes proposed changes to revise the upper limit of the Core Makeup Tank (CMT) boron concentration Technical Specification (TS) Surveillance Requirement (SR), the mass of trisodium phosphate (TSP) required by TS Limiting Condition for Operation (LCO) and associated SR, and the frequency of performance of the CMT boron concentration TS SR.

The purpose of the audit was to gain a better understanding of the proposed changes and to review related documentation and non-docketed information in order to evaluate the acceptability of the proposed changes.

B. Regulatory Audit Basis

This regulatory audit is based on the following:

- VEGP Unit 3, Current Facility Combined License NPF-91, Revised June 23, 2020, Appendix A, Technical Specifications, SR 3.5.2.4, LCO 3.6.8 and SR 3.6.8.1 (ADAMS Accession No. ML14100A106).
- VEGP Unit 4, Current Facility Combined License NPF-92, Revised June 23, 2020, Appendix A, Technical Specifications, SR 3.5.2.4, LCO 3.6.8 and SR 3.6.8.1 (ADAMS Accession No. ML14100A135).
- VEGP Units 3 and 4 UFSAR Tier 1, Revision 7, June 14, 2019 (ADAMS Accession No. ML19171A045).
- VEGP Units 3 and 4 UFSAR Tier 2, Revision 8, June 14, 2019 (ADAMS Accession No. ML19171A096).

The audit plan is available in ADAMS under Accession No. ML20133K106.

C. Logistics

Date: May 18, 2020 – August 12, 2020

Location: The audit was conducted through the Westinghouse Electric Company's (Westinghouse) electronic reading room (ERR).

Enclosure

D. Audit Team

The following U.S. Nuclear Regulatory Commission (NRC) staff members participated in substantive discussions during the audit:

- Tony Gardner, Physical Scientist
- Joshua Miller, Nuclear Engineer
- John Budzynski, Nuclear Engineer
- Stephen Smith, Senior Safety and Plant Systems Engineer
- Jennivine Rankin, Project Manager
- Olivier Lareynie, Nuclear Engineer (Foreign Assignee)

E. Licensee and Industry Staff Participants

The licensee contact was Ryan Henderson. The following personnel from SNC and Westinghouse participated in the audit:

- Jeffrey Hausaman (SNC)
- Mike Elmer (SNC)
- Jonathan Hartman (SNC)
- Harvey Taylor (SNC)
- Carly Belovesick (Westinghouse Electric Company (WEC))
- Kevin May (WEC)
- Hong Xu (WEC)

F. Documents Audited

SNC and Westinghouse made the documents listed in Table 1 available on the ERR for NRC staff to audit. The documents included detailed calculations used to support the changes to the mass of TSP and the Computational Fluid Dynamic (CFD) modeling temperature calculations supporting the change of the frequency of performance of the CMT boron concentration TS SR.

Table 1 – Documents Available for the Audit

Number	Westinghouse Document No.	Title	Revision No.	Document Date
1	APP-PXS-M3C-021	AP1000 Post LOCA pH Adjustment	3	7/25/2018
2	APP-PXS-M3C-086	Core Makeup Tank (CMT) Boron Concentration Surveillance Frequency	0	4/28/2020
3	APP-PXS-M3C-303	Stratification in the CMT Balance Line During Borated Water Make Up Injection	0	10/11/2019
4	APP-PXS-M3C-304	CFD Analysis for CMT Inlet In-Leakage Sensitivities	0	4/24/2020
5	SV0-FSAR-GF-003	Responses to NRC Audit Clarification Questions from June 8 and 10, 2020 review of LAR-20-004 (LAR-231) CMT Boron Sampling Frequency TS Change	0	6/22/2020

G. Description of Audit Activities and Summary of Observations

The NRC staff reviewed the documents listed in Section F to verify the information and conclusions in LAR 20-004. In particular the staff focused its audit review on calculations:

- supporting the increase of the mass of TSP required for the pH adjustment baskets,
- supporting SNC demonstration that CMT Boron concentrations remain above the minimum TS limit considering the proposed sampling frequency of 31 days and the potential leakage rates from the reactor coolant system to the CMT.

The staff conducted audit clarification teleconferences with the SNC and Westinghouse staff on June 8 and July 1, 2020 to better understand the following items:

- the calculations and data provided in the ERR, in particular the assumptions used in the calculations and their justification,
- the safety factors assigned to account for uncertainties and assure conservatism in the temperature CFD calculations,
- the monitoring and trending of the CMT temperature and the operators' response to unexpected or abnormal changes of temperature, including below the alarm set-point.

At these teleconferences, SNC and Westinghouse provided clarification regarding the staff discussion topics. As a result of these discussions, SNC also made additional information available on the ERR for staff review (items number 4 and 5 in Table 1). This additional information consisted of answers to specific questions related to the topics mentioned above (item 5) and an additional document including thermal hydraulic analysis of the CMT and its balance line during the period of CMT leakage (item 4).

During the audit teleconferences, the staff was able to get a better understanding of the CFD analysis and the operation of the plant as it pertains to this analysis. The staff asked questions on the use of multipliers as conservatisms in the CFD calculation provided for the audit.

Although no benchmarking is available for the CFD, the licensee stated that key parameters were assessed using a multiplier between 10 and 100 percent to add conservatism to the calculation. Also to account for the modeling uncertainty, a multiplier of 1.5 was used to bias in a conservative direction.

The staff also questioned the stratification of the CMT used in the CFD calculation. The licensee stated that operating experience had shown that stratification does occur and the low velocity of in-leakage would not provide sufficient mixing to the CMT to cause a uniform temperature. The staff also asked for the location of the thermocouple used to monitor temperature in the CMT and was provided information to show that there are thermocouples at the top of the tank that would allow the licensee to detect temperature changes in the stratified tank.

The staff could not confirm that the calculations adequately accounted for uncertainties related to the magnitude of leakage that could be detected by relying on the CMT tank high temperature alarm. However, information provided during the audit allowed the staff to determine that a leakage rate that could lead to a significant dilution of the boron concentration in the CMT could be identified by trending CMT tank temperature and monitoring prior to reaching the alarm.

Based on the review of the information made available in support of LAR 20-004 provided to the NRC staff via the ERR, the NRC staff did identify the need for the licensee to submit additional information on the docket related to the monitoring and trending of the CMT temperature. As a result, SNC submitted a Supplement to Request for License Amendment: Core Makeup Tank Boron Concentration Requirements, on July 23, 2020.

During the audit the NRC staff also identified that TS 3.5.3, the CMT TS for lower mode operation, relies on the SRs from TS 3.5.2 to ensure that its LCO is met. Although the LAR requests changes to the SRs, it does not discuss the potential effects on TS 3.5.3. Based on information discussed during the audit, the staff determined that the ability to detect leakage from the CMT in lower modes is not significant to plant risk.

H. Exit Briefing

The staff conducted an exit briefing on August 12, 2020. The licensee and staff discussed that there was no need for any additional information to be provided.

I. Requests for Additional Information (RAI) Resulting from Audit

No RAIs were issued as a result of this audit.

J. Open Items and Proposed Closure Paths

There were no open items as a result of this audit.

K. Deviations from the Audit Plan

The duration of the audit was extended in order to allow staff additional time to examine documents that were added to the electronic reading room.

L. References

1. Southern Nuclear Operating Company, Request for License Amendment: Core Makeup Tank Boron Concentration Requirements (LAR-20-004) (ADAMS Accession No. ML20121A288).
2. Nuclear Regulatory Commission, Audit Plan for Vogtle Electric Generating Plant Units 3 and 4, Request for License Amendment: Core Makeup Tank Boron Concentration Requirements (LAR 20-004) (ADAMS Accession No. ML20133K106).